



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,904	01/26/2004	Yu-Nung Shen	CU-3554 RJS	2725
26530	7590	05/20/2005	EXAMINER	
LADAS & PARRY LLP 224 SOUTH MICHIGAN AVENUE SUITE 1200 CHICAGO, IL 60604			WILSON, SCOTT R	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 05/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SM

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/764,904	SHEN, YU-NUNG	
	<b>Examiner</b>	<b>Art Unit</b>	
	Scott R. Wilson	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-21 is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6-10 is/are rejected.
- 7) ☒ Claim(s) 4, 5 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Specification*

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: COMPACT INTEGRATED CIRCUIT PACKAGE.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or  
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-3 and 6-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al.. As to claim 1, Liu et al., Figure 9, discloses a semiconductor device comprising: a die-mounting substrate (102) having a die-mounting surface and which may be, in a particular embodiment shown in Figure 10A, formed with at least one conductive contact (154)(col. 6, line 66) on said die-mounting surface; at least one semiconductor die (200) attached to said die-mounting surface, having a pad-mounting surface opposite to said die-mounting surface, and formed with at least one bonding pad (124) on said pad-mounting surface; a dielectric interposer (126) provided on said die-mounting surface and formed with at least one pad-through-hole (Fig. 4B, element 134) and at least one contact-through-hole (col. 6, lines 64-66), said pad-through-hole receiving said die therein and exposing said pad-mounting surface therefrom, said contact-through-hole being registered with said contact and exposing said contact therefrom; at least one conductive strip (Fig. 5, element 136, and Fig. 9, element 142) formed on said pad-mounting surface

Art Unit: 2826

and said interposer, said conductive strip having a pad-connecting part that is electrically connected to and that extends from said bonding pad, and a trace part that extends from said pad-connecting part to connect electrically with said contact; at least one an encapsulant layer (148) formed on said die-mounting surface, said interposer, said conductive strip, and said pad-mounting surface of said die, and formed with at least one bump-through-hole which exposes a portion of said trace part of said conductive strip therefrom; and least one solder bump (152) which fills said bump-through-hole to connect electrically with said portion of said trace part said conductive strip and which protrudes outwardly from said encapsulant layer.

As to claim 2, Liu et al. discloses (col. 7, lines 37-41) solder bumps formed from conductive paste, and this method would be applicable to the conductive strip as well.

As to claim 3, Liu et al. discloses (col. 3, line 66) that the die-mounting substrate (102) may be formed from ceramic.

As to claim 6, Liu et al. discloses (col. 6, lines 47-50) that the encapsulant (148) may be formed from solder mask, which is known to be within the scope of either a photo ink or polyimide.

As to claim 7, Liu et al. discloses (col. 5, lines 8-9) that the interposer may be made of polyimide, which is within the scope of being a resinous packaging substrate.

As to claim 8, Liu et al. discloses (col. 5, lines 8-9) that the interposer may be made of polyimide.

Claims 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Storli. As to claim 9, Storli, Figure 1C, discloses a semiconductor device comprising: a die-mounting substrate (12) having a die-mounting surface that is indented to form a die-mounting recess, at least one semiconductor die (24) received in said die-mounting recess, having a pad-mounting surface that is exposed from said die-mounting recess and formed with at least one bonding pad (22) on said pad-mounting surface; at least one conductive strip (50) formed on said pad-mounting surface and said die surface, said conductive strip having a pad-connecting part that is electrically connected to and that extends from said bonding pad, and a trace part that extends from said pad-connecting part in a lateral direction (Fig. 1B) relative to said die surface and that is formed on said die surface; an encapsulant layer (60) formed on said die surface, said pad-mounting surface of said die, and formed with at least one bump-through-hole (40) which

Art Unit: 2826

exposes a portion of said trace part of said conductive strip therefrom; and least one solder bump (70) which fills said bump-through-hole to connect electrically with said portion of said trace part said conductive strip and which protrudes outwardly from said encapsulant layer.

As to claim 10, Storli discloses (paragraph 0023) solder balls (70) formed from conductive paste, and this method would be applicable to the conductive strip as well.

***Allowable Subject Matter***

Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The substrates of Liu et al. and Storli are metal or semiconductors.

Claims 5 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Liu et al. discloses nickel gold sublayers (205) (col. 4, lines 25-28) under the die, shown in Figure 2, but does not disclose nickel gold sublayers under the conductive strips. Storli does not disclose nickel gold sublayers.

Claims 12-21 are allowed. No prior art discloses the claimed device with first and second bump through-holes where the first bump through-hole exposes a second portion of a first conductive strip, and the second bump through-hole exposes a portion of a second conductive strip, said first and second portions of the first conductive strip being offset from each other, as in claim 12. Nor does the prior art disclose a second die attached to said first encapsulant layer, formed with second conductive strips and a second encapsulant layer, as in claim 15. No prior art discloses the claimed device formed with an interposer formed on the die, with its own conductive strips and second encapsulant layer, as in claim 18.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

Art Unit: 2826

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



NATHAN J. FLYNN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800

srw  
May 16, 2005